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THE IRRITANTS IN ADHESIVE PLASTER

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Skin reactions following the use of adhesive plaster are of frequent occurrence. Often this manifestation of the skin is not only the cause of great discomfort to the patient but actually interferes with the plan of treatment.

In making patch tests, reactions from adhesive plaster often occur and are not only annoying to the patient but may interfere with the reading of the reaction. Shelmire (1), in a recent article, summed up the obstacles that irritation from adhesive plaster presents in the field of patch testing and advocated a substitute for the adhesive plaster. This study was undertaken with the purpose of determining, if possible, the irritating substances in adhesive plaster so that an intelligent effort could be made by manufacturers to eliminate them or provide harmless substitutes.

A number of observers have been interested in the causes of dermatitis produced by adhesive plaster. Bloch reports that 1 percent of the normal population develops dermatitis from adhesive tape. Siemens (2) tested susceptible cases with the ingredients of adhesive plaster and came to the conclusion that dammar resin was responsible for some of the irritating qualities. He believed that the reaction was not based on idiosyncrasy but was really due to direct irritation. Kilmer (3) stated that, as the result of his investigations, the ingredients of adhesive tape are not irritating as such. He believes that the skin secretions are retained under the moisture-repellent coating, with a resultant maceration of the epidermis. He states that this, rather than idiosyncrasy, is the most frequent cause of the irritation. He also states, however, that there might be a few instances of reactions due to adhesive plaster which are based on specific hypersensitivity.

In our own observations the skin manifestations following applications of adhesive tape can be roughly divided into two types: In one we have erythema and, in some cases, even edema and vesicles which are due to direct traumatic irritation as the result of the application of a firmly adherent substance to the skin with resultant trauma on its removal. This reaction is usually fleeting in character or, at the most, subsides after 2 or three days.

The other type of reaction due to adhesive is caused by hypersensitivity to one or more of the ingredients of the plaster and is a dermatitis venenata, or a contact eczema. This type of reaction usually increases in severity after the removal of the plaster and lasts for a considerable period of time. In many cases the severity of the reaction increases with the continued use of the adhesive plaster.

METHODS OF MANUFACTURE OF ADHESIVE PLASTER

The methods for the manufacture of adhesive plaster are more or less secret. No textbooks could be found describing the process. A number of firms manufacturing adhesive plaster in the United States were informed as to the purpose of this study and were asked to describe their method of manufacture and to give us a list of the ingredients which they used. A number of them listed and sent samples of the ingredients used, and one manufacturer permitted us to inspect his method of manufacture and to do the patch tests required on volunteer workmen from the factory. The ingredients used are listed below. All of these were not used by any one manufacturer.

1. Rubber:
 - a. South American Para rubber.
 - b. Plantation smoked sheet.
 - c. Balata rubber.
 - d. Gutta siac.
2. Rosin, grade I.
3. "Burgundy" pitch.
4. Olibanum.
5. Beeswax.
6. Zinc oxide.
7. Anhydrous lanolin.
8. Starch.
9. Orris root.

A homogeneous mass is made by milling rubber, gutta siac, or balata, with adhesives such as rosin, pitch, and olibanum, fillers such as orris root, starch, and zinc oxide. Beeswax and lanolin are also added for other purposes. This homogeneous mass is spread by calender machines on suitable fabrics.

PATCH TESTS

For the purpose of this study 120 employees of a plant manufacturing adhesive tape were used in the experiment. Eight varieties of adhesive plaster manufactured by 6 different companies were obtained and placed as patches about 1 inch square on the arms and backs of these test subjects. They were left on for 48 hours, at the end of which time 50 of the patients showed a reaction to one or more of the adhesives applied.

There was no marked difference in reaction to any particular adhesive. The least number of reactions obtained from any adhesive was 16 percent, and the greatest number from any one adhesive was 25 percent.

The sites of the patches were again inspected 2 days after the removal of the adhesive. At that time 13 of the 70 patients in whom no reaction had been observed at the end of the 48-hour period showed late reactions. Some of the reactions seen upon the removal of the plaster had become intensified. It was interesting to observe that, in a number of instances where only a few of the adhesives seemed to give a reaction there was a delayed reaction to all of the previously inactive adhesives.

The reactions observed varied from a slight erythema to an erythema with edema, papules, and vesicle formation.

For the purposes of this study, the patients were divided into three classes:

Class A.—In this group were placed those who showed marked reactions at the first removal of the adhesive tape with continued intensification at the second inspection.

Class B.—In this group were placed those who showed a negative or only a slight erythema at the first inspection but who later developed delayed reactions.

Class C.—Patients who at no time showed anything more than varying degrees of erythema at the site of the adhesive patch.

Twenty-one of the 63 patients who had showed reactions volunteered for further patch testing with the ingredients of the adhesive plasters. Six of these were in Class A, 12 in Class B, and 3 in Class C.

It was not possible to test all of these cases, especially the women, with more than 5 of the 11 ingredients which we wished to study. However, in each instance where only a limited number of tests could be made, those substances were tried which we thought were responsible for the irritation. One of the 10 men tested had 12 patches placed on his back, because he stated that he was sensitive to raw South American Para rubber biscuits, and a piece of this material was used on him as a patch test.

SUBSTANCES USED IN PATCH TESTS

1. South American Para rubber, which had been milled, washed, and dried, ready to be incorporated into the adhesive mass.
2. Starch.
3. Lanolin.
4. Orris root.
5. I-Rosin.
6. Olibanum.
7. Gutta siac.
8. Beeswax.
9. Burgundy pitch.
10. Zinc oxide.
11. Wood rosin extracted from stumps of pine trees.

The patches were left on for 48 hours and the reactions read. They were inspected for late reactions 72 hours after the patches had been removed.

DESCRIPTION OF INGREDIENTS USED AS PATCH TESTS

The rosins used in the manufacture of adhesive plaster belong to the class of natural resins. These rosins are divided, according to T. Hedley Barry (4) into eight classes, with relation to their hardness, no. 1 being the softest:

1. Dammar resin;
2. Shellac;
3. Mastic;
4. Sandarac;
5. Rosin;
6. Elemi;
7. Turpentine oleo resin;
8. Burgundy pitch.

Rosin is obtained from trees of the order of Coniferae, genus *Pinus*. All pines may be used, but most of the rosin in the United States is collected from the long leaf and the short leaf pines. The trees are scarred, and the exuding gum is collected, and purified by filtration, sedimentation, and distillation, removing the turpentine which is the principal product. The residue, called colophony, is the source of the different grades of rosin. The rosin collected the first year that the tree is tapped is light in color and is graded by the manufacturers according to color from WW to K. The second season that the tree is tapped, the rosin obtained is darker and more viscous and is graded by the manufacturer from I to G. With successive tappings, the sap obtained contains less turpentine and less rosin.

Rosins contain a number of oils and acids. The principal ones are kidney oil, bloom oil, abietic acid (alpha, beta, and gamma), pinnic acid (alpha, beta, and gamma), sylvic acid, and abietic anhydride.

Wood rosin is a name applied to rosin extracted by a special process from the stumps of pine trees. It is very similar to ordinary rosin.

Olibanum is a gum resin obtained from the exuded juice of a tree belonging to the genus *Boswellia*, which grows in East Africa and the southern coast of Arabia. It is pale yellow, has a pleasant aromatic odor, and is used only in certain varieties of plaster so as to give them a pleasant odor.

South American Para rubber, which comes to the United States in so-called "biscuits", is obtained by tapping the rubber tree and is cured over a small fire made of the fruits or nuts of the urucuri. This fire gives a dense smoke rich in the products of distillation, such as creosote, tarry matter, and acetic acid. A long wooden rod, or mandrel, with a paddle attached, is covered with a thin film of the latex collected from the tree. This is rotated in the smoke until the latex sets, when a fresh layer of latex is poured over the first and the process repeated until a biscuit of smoked Para rubber, weighing from 20 to 100 pounds, is built up. Such a biscuit of rubber, by the very nature of the curing method, is saturated and impregnated with creosote, tarry matter, and acetic acid.

Plantation rubber is obtained from the Malay Peninsulas, the East Indies, and Sumatra. The latex is collected and is coagulated by the addition of dilute acetic acid. After the coagulum is formed, it is removed from the serum and passed through washing roller mills, which squeeze out the mother liquor and wash out extraneous materials. The sheets are then hung up to dry and are frequently smoked during the drying period by burning coconut husks and hard wood. The products of this smoking are only on the surface of the crepe formed sheet and are not impregnated into the rubber itself, as is the case with the South American Para rubber. Plantation rubber is dry and clean, while the South American Para rubber contains moisture, sand, stones, bark, and other impurities which must be cleaned out before it is used. While plantation rubber contains about 6 percent of impurities, South American Para may contain anywhere from 12 to 40 percent.

Studies made in tire-manufacturing plants, where crepe and smoked sheet rubber are exclusively used, fail to show any dermatitis among those handling the raw rubber, whereas in the course of the present studies we found one worker who develops a severe dermatitis every time he handles South American Para rubber biscuits.

Balata is the product obtained by coagulating the latex of *Mimusops globosa*, a large forest tree belonging to the order of Sapotaceae, a native of British, Dutch, and French Guiana, and Trinidad, Jamaica, and Brazil. It resembles true gutta percha in physical properties, and the tree yielding it belongs to the same order which furnishes gutta percha (*Palauquium* spp.). Balata, like gutta percha, consists of a hydrocarbon $C_{10}H_{16}$, associated with resins, but contains a

higher percentage of resins than gutta percha. The resins in balata are similar to those in gutta percha and consist of—

- (1) Albane, which is soluble in hot alcohol.
- (2) Fluavile, which is soluble in cold alcohol.

Gutta siac is very similar in its properties to balata and gutta percha.

The so-called "Burgundy" pitch used in adhesive plaster manufacture does not necessarily come from Burgundy. That which we tested was a mixture of resins and other substances, the composition of which is kept secret by the makers.

Beeswax, zinc oxide, lanolin, starch, and orris root need no description.

RESULTS OF TESTS

Class A.—The 6 persons patched in this class were males and were patched with all of the 11 substances listed above. (Altogether there were 7 cases in this group, 1 of them a woman who would not submit to more than the original tests with the 8 varieties of adhesive.) We thought that the reactions in this group were due to hypersensitivity. In all of these cases we had erythema, edema, papules, and vesicles which did not disappear but went on to eczematization. As can be seen from table 1, there was not a single instance in which there was sensitization to less than two of the ingredients used as patches. All six were sensitive to "Burgundy" pitch. Three showed marked positive reactions and two showed questionable reactions to South American Para rubber that had been milled, washed, and dried. Three showed positive patch tests to wood rosin obtained from pine-tree stumps. Two gave positive reactions to olibanum, two to beeswax, and one each to lanolin, orris root, I-rosin, and gutta siac.

Class B.—Altogether there were 34 cases put in this class. Of this number, 12 consented to further patch testing—11 women and 1 man. The man was patched with all 11 of the ingredients and the women with only 5 of them, namely, (1) South American Para rubber, which had been milled, washed, and dried; (2) I-rosin; (3) "Burgundy" pitch; (4) zinc oxide; and (5) wood rosin.

In this class we thought that we were dealing with reactions of hypersensitivity of the delayed type, because the delayed reactions in these cases were more pronounced than were the reactions seen immediately upon removal of the patches. These delayed reactions also showed erythema, edema, papules, and vesicles which persisted for a number of days. These may be the types of cases which become more and more sensitive to adhesive tape, depending on the duration of the application and the number of times within a given period that the adhesive is applied.

TABLE 1.—Summary of reactions

Class and subject	Substances for patching										
	S. A. Para rubber	Starch	Anhydrous lanolin	Orris root	I-Rosin	Olibanum	Gutta silac	Beeswax	"Burgundy" pitch	Zinc oxide	"Wood" rosin
Class A											
J. B. C. (M)-----	?	-	-	-	-	-	-	-	-	-	++
E. J. D. (M)-----	-	-	+	?	-	-	-	-	-	-	++
W. F. (M)-----	+	-	+	-	?	-	-	-	-	-	++
D. D. (M)-----	+	-	+	-	?	-	-	-	-	-	++
J. F. B. (M)-----	?	-	?	-	?	-	-	-	-	-	++
M. A. (M)-----	+	-	-	-	-	-	-	-	-	-	++
Class B											
H. A. (M)-----	-	-	0	-	-	0	0	0	0	0	-
G. K. (F)-----	-	0	0	0	0	0	0	0	0	0	-
C. D. (F)-----	+	0	0	0	0	0	0	0	0	0	-
G. V. S. (F)-----	?	0	0	0	0	0	0	0	0	0	-
M. C. (F)-----	?	0	0	0	0	0	0	0	0	0	-
L. O. H. (F)-----	+	0	0	0	0	0	0	0	0	0	-
H. K. (F)-----	?	0	0	0	0	0	0	0	0	0	-
C. H. (F)-----	-	0	0	0	0	0	0	0	0	0	-
M. F. (F)-----	-	0	0	0	0	0	0	0	0	0	-
E. W. (F)-----	-	0	0	0	0	0	0	0	0	0	-
G. O. L. (F)-----	?	0	0	0	0	0	0	0	0	0	-
M. E. L. ¹ (F)-----	-	-	-	-	-	-	-	-	-	-	-
Class C											
O. L. V. (M)-----	-	-	-	?	-	-	-	-	-	-	?
G. R. (M)-----	-	-	-	-	-	-	-	-	-	-	-
F. B. (M)-----	-	-	-	-	-	-	-	-	-	-	-
Total-----	5	1	1	6	2	1	2	8	8	8	8
Percent-----	25	5	5	30	10	5	10	40	40	40	40

¹ Reaction too general to be read for individual patches.

+ = Positive reaction.

? = Faint erythema; doubtful reaction.

- = No reaction.

0 = Not patched.

One of the women tested showed such a generalized reaction that it was impossible to differentiate between the individual patches. Six of the women showed positive reactions to one or more of the patches. Two of them showed questionable reactions to one of the patches, and 2 showed no reactions to any of the patches. The fact that no reactions, or only questionable ones, resulted in four of these women, may be interpreted either as a possible sensitization to one of the ingredients of adhesive plaster with which they were not patched or to the fact that their reactions in the first series of tests were due to the summation of effects from several of the ingredients in adhesive plaster. In this group, when the patches were first removed there were 2 reactions to rubber, 4 to I-resin, 2 to "Burgundy" pitch, and 2 to wood rosin. The sites were again inspected 72 hours after the removal of the patches. At this time the original reactions were still present and eczematoid in character. In addition there were 3 subjects who showed a questionable reaction to rubber, 1 individual who showed a positive reaction to I-resin, and 3 more

showed reactions to wood rosin. These, of course, were delayed reactions.

Class C.—We were able to obtain only three men in this group for further patching. They were patched with all of the 11 ingredients listed, and in no instance could we obtain a real positive reaction. One gave a questionable reaction to orris root, 1 a questionable reaction to beeswax, and 1 a questionable reaction to zinc oxide. We believe that the original reactions in this group to the eight patches of adhesive were due purely to mechanical irritation of the plaster and maceration of the skin. None of these reactions lasted so that they could be seen 72 hours after the patches had been removed.

SUMMARY

Twenty-one subjects showing various degrees of adhesive plaster reaction were tested with 11 ingredients of adhesive plaster. One of these developed a generalized reaction so that individual tests could not be evaluated. Seven of the remaining 20 were negative to the patch tests. Of the 13 remaining, 8 showed positive reactions to wood rosin extracted from the stumps of pine trees; 8 to so-called "Burgundy" pitch; 6 to I-rosin; 5 to South American para rubber, which had been milled, washed, and dried; 2 to beeswax; 2 to olibanum; and 1 each to lanolin, orris root, and gutta siac.

All of the subjects in class A showed positive reactions to 1 or more of the rosins, and 50 percent were sensitive to rubber.

Seven of the subjects tested in class B were sensitive to 1 or more of the rosins, and 2 were sensitive to rubber.

The tests seemed to indicate that there are two types of reactions to adhesive tape: One is purely chemical and due to resultant maceration and mechanical trauma from the application and the removal of the plaster, and the other is due to hypersensitivity to one or more of the ingredients of the plaster. The results indicate that the chief irritants in the adhesive plasters that we tested are the rosins, in which can be included the so-called "Burgundy" pitch, and the smoke-cured wild rubber, of which South American Para is an example.

An attempt was made to determine whether complexion or previous diseases of the skin or an allergic diathesis had a predisposing effect on sensitivity to adhesive plaster. All the subjects patched with adhesive plaster were questioned as to these facts. No such correlation could be established.

CONCLUSIONS

1. Skin reactions following the use of adhesive plaster are of frequent occurrence.
2. There are two kinds: (a) Due to traumatic phenomena and maceration resulting from the application and removal of a firmly

adherent material; and (b) an eczematoid reaction due to hypersensitivity to one or more of the ingredients of the plaster.

3. The reaction classed under 2 (a) disappears shortly after the removal of the plaster.

4. The reaction classed under 2 (b) persists for many days.

5. The chief irritants in adhesive plaster have been found to be the resins and the smoke-cured wild rubber.

6. It is obvious that the irritation due to the tackiness of the adhesive cannot be avoided. It seems, however, that research in adhesive manufacture should make it possible to substitute nonirritating types of resins and rubber for the present types used.

REFERENCES

- (1) Shelmire, Bedford: Contact eczema: Rubber cements as adhesive in patch testing. *Arch. Dermat. and Syph.*, Vol. 28 (Dec. 1933), p. 795.
- (2) Siemens, H. W.: Literary Digest, Vol. 87 (Nov. 21, 1927). (Extract from *München. med. Wehnschr.*, Vol. 74, p. 1407.)
- (3) Kilmer, F. B.: Private communication from Johnson & Johnson Co.
- (4) Barry, T. Hedley: Natural varnish resins. Benn, London. 1932.
- (5) Stevens, H. P.: Latex. A pamphlet issued by the Rubber Growers' Association, London. 1933.
- (6) Hovey, A. G.: Alkyd resins as bonding materials. *Indian and English Chem. Jour.*, Vol. 25 (June 15, 1933), p. 163.
- (7) Brown, W. P.: Sensitization to adhesive plaster. *Arch. Dermat. and Syph.*, Vol. 12 (July 1925), p. 69.
- (8) Montgomery, D. W., and Culver, G. D.: Dermatitis from adhesive plaster. *Med. Jour. and Record*, Vol. 124 (Nov. 17, 1926), p. 606.
- (9) Sever, J. Warren: Sensitivity to adhesive tape. *Jour. Am. Med. Assoc.*, Vol. 83 (July 5, 1924), p. 59.
- (10) Jantzen, George H.: Sensitivity to adhesive plaster. *Jour. Am. Med. Assoc.*, Vol. 82 (June 21, 1924), p. 2070.

COURT DECISION ON PUBLIC HEALTH

Power of city to prohibit and regulate privies not limited by contract between it and individual regarding cleaning of privies.—(Arkansas Supreme Court; *Bowers v. City of North Little Rock*, 77 S. W.(2d) 797; decided January 14, 1935.) The plaintiff, under the terms of a contract with the defendant city, was given the right to clean unsewered privies in the city. For such cleaning he was entitled to receive certain stipulated amounts from the occupants of the premises. While this contract was in effect the city passed an ordinance which provided (a) that no unsewered privy should be erected or used on any property to which the public water supply was available and which was within three hundred feet of an existing sanitary sewer to which said property might be connected, (b) that all privies built within the city should be of an approved sanitary type, and (c) that no pit-type

sanitary privy should be constructed without written approval by either the county or city health officer. Under this ordinance the health authorities approved and encouraged the erection of pit-type sanitary privies, and a number of such privies had been, and were being, installed when the plaintiff brought an action on the ground that the ordinance and the action of the health department thereunder lessened the number of unsewered privies to be cleaned, amounting to an impairment of the obligation of his contract. He prayed that the city and its officers be prohibited from building or causing to be built the new type of pit privy.

The supreme court took the view that the plaintiff's contention as to the impairment of the obligation of his contract could not be sustained, stating in part as follows:

* * * It is familiar law that the State cannot part with its rights to exercise the inherent attributes of sovereignty, among which undoubtedly is the police power. The retention and exercise of this power by the State is necessary for the protection of citizens and cannot by any means be bartered away. This applies to the police power delegated to municipal corporations. It is a continuing power which the municipality cannot part with by contract, or by any other means. This being the law, it follows that the city of North Little Rock was in the proper exercise of its powers in seeking the installation of privies which, in the judgment of the health authorities, would tend to preserve the health of its citizens although some damage might result to the appellant. Of this he cannot complain, for he took his contract subject to the exercise by the city of its police power whenever the need might arise.

The decree of the lower court in favor of the defendant city was affirmed.

DEATHS DURING WEEK ENDED MAY 25, 1935

[From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended May 25, 1935	Correspond- ing week, 1934
Data from 86 large cities of the United States:		
Total deaths.....	8,352	8,242
Deaths per 1,000 population, annual basis.....	11.6	11.5
Deaths under 1 year of age.....	529	613
Deaths under 1 year of age per 1,000 estimated live births.....	49	57
Deaths per 1,000 population, annual basis, first 21 weeks of year.....	12.5	12.4
Data from industrial insurance companies:		
Policies in force.....	67,771,202	67,801,274
Number of death claims.....	13,094	13,024
Death claims per 1,000 policies in force, annual rate.....	10.1	10.0
Death claims per 1,000 policies, first 21 weeks of year, annual rate.....	10.7	10.9

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

CURRENT WEEKLY STATE REPORTS

These reports are preliminary, and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 1, 1935, and June 2, 1934

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934
New England States:					280	6	0	1
Maine	4							
New Hampshire	1							
Vermont					14	39	0	0
Massachusetts	9	11			376	911	3	0
Rhode Island		5	3		452	26	2	0
Connecticut	7				592	183	0	0
Middle Atlantic States:								
New York	28	35	14	13	2,475	1,029	23	6
New Jersey	11	21	9	5	1,931	652	6	0
Pennsylvania	18	27			2,168	2,282	9	0
East North Central States:								
Ohio	32	37	62	38	2,038	2,309	14	0
Indiana	24	5	9	15	215	900	0	1
Illinois	42	23	15	32	1,413	2,230	16	14
Michigan	7	12	3	3	2,648	421	2	1
Wisconsin	5	4	36	21	1,481	1,971	0	0
West North Central States:								
Minnesota	10	6	2	1	279	218	0	1
Iowa	11	6			204	312	0	0
Missouri	20	27	37	13	333	315	8	3
North Dakota		6	4		47	69	0	0
South Dakota	4		1	1	24	219	0	2
Nebraska	19	1	1		343	90	1	0
Kansas	3	4			545	486	3	0
South Atlantic States:								
Delaware	2				10	77	0	0
Maryland ¹	3	4	1	3	74	1,207	8	0
District of Columbia ¹	13	10	1		28	33	6	0
Virginia	10	9			380	945	2	1
West Virginia	9	8	11	7	305	161	3	0
North Carolina ¹	7	3	2	3	74	1,047	3	1
South Carolina	3	4	88	134	1	169	1	0
Georgia	1	2				99	0	0
Florida ¹	4	8	1	1	20	230	0	0

See footnotes at end of table.

*Cases of certain communicable diseases reported by telegraph by State health officers
for weeks ended June 1, 1935, and June 2, 1934—Continued*

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934
East South Central States:								
Kentucky	3	6	5	9	105	495	5	0
Tennessee	4	6	8	14	41	333	3	2
Alabama ¹	10	9	18	8	103	501	0	0
Mississippi ²	5	2					2	0
West South Central States:								
Arkansas	5	2	28		81	19	1	0
Louisiana	15	11	4	5	38	145	1	1
Oklahoma ¹	11	4	31	15	49	106	1	0
Texas ¹	32	4	45	178	53	829	3	2
Mountain States:								
Montana ¹		4	44	3	282	25	1	1
Idaho ¹		2			8	11	0	0
Wyoming ¹		1			23	146	1	0
Colorado ¹	13	5			506	2,112	0	0
New Mexico	6	4	9		14	62	3	0
Arizona	2	4	6	9	53	12	4	0
Utah ¹				2	2	31	0	0
Pacific States:								
Washington ¹	1				461	192	1	0
Oregon ¹	21	25	15	9	215	42	4	0
California			27	18	1,281	448	7	2
Total	435	368	530	552	22,065	24,296	147	40
First 22 weeks of year	13,910	16,025	100,639	45,238	598,436	582,885	3,142	1,227

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934
New England States:								
Maine	1	0	13	9	0	0	2	6
New Hampshire	0	0	20	6	0	0	0	0
Vermont	0	0	4	19	0	0	0	3
Massachusetts	0	0	246	230	0	0	3	3
Rhode Island	0	0	15	21	0	0	1	1
Connecticut	0	0	96	41	0	0	2	0
Middle Atlantic States:								
New York	1	1	959	645	0	0	7	7
New Jersey	2	0	157	133	0	0	3	3
Pennsylvania	0	1	338	397	0	0	7	11
East North Central States:								
Ohio	0	1	560	892	0	0	7	13
Indiana	0	0	89	71	0	2	7	8
Illinois	1	1	1,138	522	4	4	6	6
Michigan	1	0	268	478	0	1	5	4
Wisconsin	0	0	456	268	9	19	1	1
West North Central States:								
Minnesota	1	0	276	73	16	3	3	2
Iowa	1	1	68	36	3	1	0	2
Missouri	0	1	48	53	4	1	8	8
North Dakota	0	0	40	41	0	0	2	1
South Dakota	0	1	12	4	5	1	0	0
Nebraska	0	0	38	14	53	5	4	0
Kansas	0	1	39	27	22	1	7	2
South Atlantic States:								
Delaware	0	0	6	2	0	0	0	0
Maryland ¹	0	0	76	43	0	0	4	8
District of Columbia ¹	0	0	31	7	0	0	0	1
Virginia ¹	2	0	20	18	0	0	12	7
West Virginia ¹	1	1	58	47	0	0	6	11
North Carolina ¹	25	1	14	11	0	0	5	4
South Carolina	1	0	1	1	0	0	16	6
Georgia	1	0	2	2	0	0	3	14
Florida ¹	1	0	4	0	0	0	2	3

See footnotes at end of table.

*Cases of certain communicable diseases reported by telegraph by State health officers
for weeks ended June 1, 1935, and June 2, 1934—Continued*

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934	Week ended June 1, 1935	Week ended June 2, 1934
East South Central States:								
Kentucky	0	0	24	27	0	0	3	14
Tennessee	0	0	18	19	0	2	11	8
Alabama ¹	2	0	7	5	0	0	7	5
Mississippi ¹	1	0	5	2	0	1	4	5
West South Central States:								
Arkansas	0	0	1	3	2	2	6	3
Louisiana	4	2	7	7	0	0	6	10
Oklahoma ¹	0	2	6	7	3	2	5	5
Texas ¹	0	0	28	36	24	33	10	26
Mountain States:								
Montana ¹	0	0	6	8	0	0	6	2
Idaho ¹	0	0	3	1	0	1	0	0
Wyoming ¹	0	0	8	17	5	0	0	0
Colorado ¹	0	0	172	22	3	2	0	0
New Mexico	0	0	9	6	1	0	3	2
Arizona	1	0	41	4	0	0	3	4
Utah ¹	0	0	117	6	0	1	0	0
Pacific States:								
Washington ¹	0	1	56	60	21	1	2	3
Oregon ¹	0	1	23	40	2	2	3	0
California	3	163	211	107	10	1	5	3
Total	50	179	5,834	4,488	187	86	197	228
First 22 weeks of year	566	771	155,197	128,750	4,168	3,223	3,108	3,696

¹ New York City only.

² Week ended earlier than Saturday.

³ Rocky Mountain spotted fever, week ended June 1, 1935, 26 cases, as follows: District of Columbia, 1; Montana, 10; Wyoming, 9; Colorado, 2; Washington, 1; Oregon, 3.

⁴ Typhus fever, week ended June 1, 1935, 17 cases, as follows: North Carolina, 2; Florida, 1; Alabama, 8; Texas, 2; Idaho, 4.

¹ Exclusive of Oklahoma City and Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Menin-gococcus menin-gitis	Diph-theria	Influenza	Malaria	Measles	Pel-lagra	Polio-myelitis	Scarlet fever	Small-pox	Ty-phoid fever
<i>April 1935</i>										
California	33	111	243	3	7,065	10	18	970	14	21
Nevada	2		10		37		0	19	1	0
New York	111	136		4	12,925		4	5,244	0	22
Oklahoma ¹	15	36	293	47	647	20	2	50	1	13
Puerto Rico	46	25	920	210			30		0	19
Tennessee	17	30	246	63	205	16	0	92	1	22
Washington	16	13	57		1,604		4	242	98	4
Wyoming	5				676		1	90	54	1

¹ Exclusive of Oklahoma City and Tulsa.

April 1935		Conjunctivitis: Oklahoma ¹	Filariasis: Puerto Rico
Actinomycosis:	Cases	Dysentery:	Food poisoning:
California	1	California (amoebic)...	Puerto Rico
Anthrax:		California (bacillary)...	California
Oklahoma ¹	1	New York (amoebic)...	German measles:
Chicken pox:		New York (bacillary)...	California
California	4,483	Oklahoma ¹ ...	New York
Nevada	86	Puerto Rico	Tennessee
New York	3,497	Epidemic encephalitis:	Washington
Oklahoma ¹	63	California	Granuloma, coccidioidal:
Puerto Rico	213	New York	California
Tennessee	164	Tennessee	Impetigo contagiosa:
Washington	678	Washington	Oklahoma ¹
Wyoming	25		Jaundice:
			California

¹ Exclusive of Oklahoma City and Tulsa.

	Cases		Cases		Cases
Leprosy:		Rocky Mountain spotted fever:		Tularaemia:	
California.....	3	Wyoming.....	8	Oklahoma.....	1
Mumps:		Scabies:		Tennessee.....	4
California.....	1,376	Tennessee.....	2	Wyoming.....	1
Oklahoma ¹	112	Septic sore throat:		Typhus fever:	
Puerto Rico.....	141	California.....	6	California.....	1
Tennessee.....	130	Nevada.....	1	New York.....	2
Washington.....	668	New York.....	413	Tennessee.....	1
Wyoming.....	4	Oklahoma ¹	39	Undulant fever:	
Ophthalmia neonatorum:		Tennessee.....	4	California.....	7
California.....	1	Washington.....	1	New York.....	15
New York.....	11	Wyoming.....	3	Washington.....	3
Oklahoma ¹	1	Tetanus:		Vincent's infection:	
Puerto Rico.....	4	California.....	3	New York ²	69
Paratyphoid fever:		New York.....	3	Oklahoma ¹	1
California.....	2	Oklahoma ¹	2	Tennessee.....	3
New York.....	6	Tetanus, infantile:		Whooping cough:	
Tennessee.....	2	Puerto Rico.....	2	California.....	819
Washington.....	1	Trachoma:		Nevada.....	10
Psittacosis:		California.....	39	New York.....	2,804
California.....	1	Oklahoma ¹	10	Oklahoma ¹	154
Puerperal septicemia:		Tennessee.....	9	Puerto Rico.....	179
Puerto Rico.....	4	Trichinosis:		Tennessee.....	155
Tennessee.....	1	California.....	8	Washington.....	107
Washington.....	1	New York.....	12	Wyoming.....	63
Rabies in animals:		Yaws:		Yaws:	
California.....	122	Puerto Rico.....	2	Puerto Rico.....	2
New York ¹	3				
Washington.....	6				

¹ Exclusive of Oklahoma City and Tulsa.² Exclusive of New York City.

PLAQUE-INFECTED GROUND SQUIRRELS IN LAKE COUNTY, OREG.

Two ground squirrels found dead in Lake County, Oreg., have been proved positive for plague. One squirrel was found on May 11, 1935, about 2 miles east, and one on May 23, about 25 miles northeast, of Lakeview.

WEEKLY REPORTS FROM CITIES

City reports for week ended May 25, 1935

[This table summarizes the reports received regularly from a selected list of 121 cities for the purpose of showing a cross section of the current urban incidence of the communicable diseases listed in the table. Weekly reports are received from about 700 cities, from which the data are tabulated and filed for reference]

State and city	Diph- theria, cases	Influenza		Pneu- monia, deaths	Scar- let fever, cases	Small- pox, cases	Tuber- culosis, deaths	Ty- phoid fever, cases	Whoop- ing cough, cases	Deaths, all causes
		Cases	Deaths							
Maine:										
Portland.....	0	0	0	2	4	0	1	0	8	25
New Hampshire:										
Concord.....	0	0	0	1	1	0	0	0	0	11
Nashua.....	0	0	0		2	0		0	0	
Vermont:										
Barre.....	0	0	10	0	0	0	1	0	1	4
Burlington.....	0	0	13	0	0	0	0	0	0	8
Massachusetts:										
Boston.....	2	0	77	21	58	0	13	0	24	250
Fall River.....	1	0	7	0	11	0	1	0	0	28
Springfield.....	0	0	79	1	15	0	1	0	0	39
Worcester.....	0	0	5	5	28	0	0	0	0	44
Rhode Island:										
Pawtucket.....	0	0	0	0	0	0	0	0	0	17
Providence.....	0	0	416	5	9	0	0	0	4	68
Connecticut:										
Bridgeport.....	0	1	1	19	0	14	0	2	0	37
Hartford.....	0	0	17	4	10	0	2	0	15	38
New Haven.....	0	0	181	0	1	0	0	0	1	35
New York:										
Buffalo.....	0	0	39	11	81	0	5	0	10	161
New York.....	22	5	3,1415	149	597	0	91	2	158	1,580
Rochester.....	0	0	63	6	17	0	1	0	14	79
Syracuse.....	0	0	512	3	25	0	1	0	17	38

City reports for week ended May 25, 1935—Continued

State and city	Diph- theria, cases	Influenza		Meas- sles, cases	Pneu- monia, deaths	Scar- let fever, cases	Small- pox, cases	Tuber- culosis, deaths	Ty- phoid fever, cases	Whoop- ing cough, cases	Deaths, all causes
		Cases	Deaths								
New Jersey:											
Camden	1		1	3	4	3	0	1	0	4	34
Newark	0	2	0	424	9	11	0	7	0	54	104
Trenton	2		0	1	2	14	0	5	0	1	49
Pennsylvania:											
Philadelphia	6	4	1	94	31	90	0	21	2	79	520
Pittsburgh	2	4	1	233	23	52	0	9	0	21	160
Reading	0		0	141	1	5	0	0	1	1	23
Scranton	0			15		3	0		0	0	
Ohio:											
Cincinnati	8		0	14	15	24	0	9	0	3	133
Cleveland	5	22	4	399	19	41	0	13	0	32	228
Columbus	0	2	2	85	3	21	0	1	0	1	73
Toledo	0	1	0	87	10	17	0	4	0	7	82
Indiana:											
Fort Wayne	5		0	3	5	2	0	0	0	1	36
Indianapolis	2		0	133	13	11	0	0	0	18	111
South Bend	0		0	7	4	6	0	0	0	1	16
Terre Haute	1		0	4	0	0	0	0	0	0	23
Illinois:											
Chicago	31	4	0	987	43	633	0	44	1	73	682
Springfield	1		0	10	5	6	0	0	0	0	20
Michigan:											
Detroit	8	3	2	910	24	128	0	12	0	110	273
Flint	3		0	4	8	16	0	0	0	5	40
Grand Rapids	0		0	173	4	17	0	0	0	24	33
Wisconsin:											
Kenosha	0		0	8	0	12	0	0	0	1	4
Milwaukee	0	1	1	438	2	93	0	3	0	25	78
Racine	0		0	183	1	14	0	0	0	11	12
Superior	0		0	20	0	1	0	0	0	3	6
Minnesota:											
Duluth	0		0	64	3	4	0	1	1	0	22
Minneapolis	4		0	35	6	88	0	0	0	20	86
St. Paul	0		0	12	10	53	1	1	1	7	69
Iowa:											
Davenport	1		0		3	0			0	0	
Des Moines	3		0	46	0	3	1	0	0	0	40
Sioux City	0		0	0	0	0	0	0	0	2	0
Waterloo	2			2		8	0		0	0	
Missouri:											
Kansas City	4		0	39	9	9	0	4	0	0	94
St. Joseph	1		0	3	2	4	0	2	0	3	44
St. Louis	12		0	19	9	15	0	9	0	6	176
North Dakota:											
Fargo	0		0	2	0	14	0	0	0	0	3
Grand Forks	0		0			0	0		0	0	
South Dakota:											
Aberdeen	0			3		1	0		0	0	
Nebraska:											
Omaha	2		0	78	3	6	1	4	0	0	44
Kansas:											
Topeka											
Wichita	0		0	76	3	0	0	2	0	5	27
Delaware:											
Wilmington	1		0	7	5	6	0	1	0	1	21
Maryland:											
Baltimore	2	3	2	42	16	52	0	11	0	18	224
Cumberland	0		0	5	0	2	0	1	0	0	12
Frederick	0		0	2	0	1	0	0	0	0	3
District of Colum- bia:											
Washington	11		0	66	12	46	0	12	1	4	170
Virginia:											
Lynchburg	1		0	2	1	1	0	0	0	24	13
Norfolk	0		0	0	1	2	0	0	1	3	26
Richmond	1		0	32	2	3	0	2	0	1	44
Roanoke	0		0	13	1	0	0	0	1	0	13
West Virginia:											
Charleston	0		0	15	3	1	0	0	0	1	21
Huntington	0		0	10		3	0		0	0	
Wheeling	0		0	47	0	4	0	2	0	1	24
North Carolina:											
Raleigh	0		0	3	0	0	0	0	0	4	6
Wilmington	0		0	0	0	0	0	0	0	5	7
Winston-Salem	0		0	1	1	2	0	0	0	10	14

City reports for week ended May 25, 1935—Continued

State and city	Diph- theria, cases	Influenza		Meas- sles, cases	Pneu- monia, deaths	Scar- let fever, cases	Small- pox, cases	Tuber- culosis, deaths	Ty- phoid fever, cases	Whoop- ing cough, cases	Deaths, all causes
		Cases	Deaths								
South Carolina:											
Charleston	0	4	0	1	3	1	0	0	1	0	20
Columbia	0	—	0	0	2	0	0	0	0	0	17
Greenville	0	—	0	0	6	0	0	0	0	1	14
Georgia:											
Atlanta	4	6	0	3	3	3	0	9	2	15	80
Brunswick	0	—	0	1	0	0	0	0	0	3	2
Savannah	0	—	0	5	0	0	0	4	1	1	31
Florida:											
Miami	0	1	1	0	0	1	0	0	0	3	26
Tampa	0	—	0	15	1	0	0	2	2	1	24
Kentucky:											
Ashland											
Lexington	0	—	0	10	3	0	0	2	0	5	17
Louisville	0	2	0	120	7	10	0	2	0	6	79
Tennessee:											
Memphis	1	—	1	0	4	3	0	8	1	5	94
Nashville	0	—	0	1	3	0	0	1	0	6	44
Alabama:											
Birmingham	3	—	1	31	1	2	0	3	0	2	72
Mobile	1	—	0	6	0	—	0	1	1	0	14
Montgomery	0	—	0	—	0	0	0	—	1	1	—
Arkansas:											
Fort Smith	0	—	4	—	—	0	0	—	0	4	—
Little Rock	0	—	5	2	2	2	0	1	0	7	—
Louisiana:											
New Orleans	8	—	0	10	12	1	0	8	1	0	131
Shreveport	0	—	0	0	6	0	0	3	2	2	33
Texas:											
Dallas	2	—	0	0	2	2	0	0	1	2	45
Fort Worth	1	—	0	0	2	1	0	1	0	0	32
Galveston	0	—	0	0	2	2	0	1	1	0	13
Houston	12	—	0	0	9	2	0	5	0	0	68
San Antonio	1	—	1	2	9	1	0	6	0	0	58
Montana:											
Billings											
Great Falls	0	—	0	1	4	0	0	0	0	16	10
Helena	0	—	6	0	0	0	0	0	0	0	6
Missoula	0	—	0	0	1	0	0	0	0	0	7
Idaho:											
Boise	0	—	0	0	1	0	0	0	0	0	10
Colorado:											
Denver	7	—	1	207	6	63	1	9	0	1	88
Pueblo	2	—	0	34	0	9	0	0	0	2	6
New Mexico:											
Albuquerque	0	—	0	3	2	0	0	2	0	0	14
Utah:											
Salt Lake City	2	—	0	0	2	104	0	2	0	109	31
Nevada:											
Reno	0	—	0	0	0	0	0	0	0	0	8
Washington:											
Seattle	1	—	2	180	9	19	2	6	1	12	89
Spokane	0	2	2	56	2	1	0	0	0	0	32
Tacoma	0	—	—	3	—	3	4	—	0	0	—
Oregon:											
Portland	0	1	0	66	3	5	0	1	0	0	55
Salem	0	2	—	2	—	0	0	—	0	0	—
California:											
Los Angeles	13	19	0	122	12	53	5	21	0	19	279
Sacramento	0	1	1	257	0	9	0	4	0	0	0
San Francisco	0	—	0	138	6	21	0	8	0	40	146

June 14, 1935

City reports for week ended May 25, 1935—Continued

State and city	Meningococcus meningitis		Polio-myelitis cases	State and city	Meningococcus meningitis		Polio-myelitis cases
	Cases	Deaths			Cases	Deaths	
Massachusetts:				Nebraska:			
Boston	0	0	1	Omaha	0	1	0
Rhode Island:				Maryland:			
Providence	1	1	0	Baltimore	8	5	0
New York:				District of Columbia:			
New York	7	6	2	Washington	10	3	0
Pennsylvania:				Virginia:			
Philadelphia	2	2	0	Lynchburg	1	0	0
Pittsburgh	1	1	0	Norfolk	1	2	0
Ohio:				North Carolina:			
Cincinnati	9	2	0	Raleigh	0	0	1
Toledo	1	0	0	Kentucky:			
Indiana:				Louisville	1	0	0
Indianapolis	1	0	0	Tennessee:			
Terre Haute	1	0	0	Nashville	1	1	0
Illinois:				Louisiana:			
Chicago	11	5	0	New Orleans	1	2	0
Springfield	1	0	0	New Mexico:			
Michigan:				Albuquerque	0	1	0
Detroit	1	1	1	Oregon:			
Wisconsin:				Portland	0	1	0
Milwaukee	1	0	0	California:			
Minnesota:				Los Angeles	2	1	3
Minneapolis	1	0	0	Sacramento	1	0	0
Missouri:				San Francisco	1	0	0
Kansas City	0	1	0				
St. Joseph	2	0	0				

Epidemic encephalitis.—Cases: New York, 1; Trenton, 1; Toledo, 1; Washington, 1.

Pellagra.—Cases: Charleston, S. C., 1; Atlanta, 1; Savannah, 4; Tampa, 1; Mobile, 2; New Orleans, 2.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—2 weeks ended May 18, 1935.—During the 2 weeks ended May 18, 1935, cases of certain communicable diseases were reported by the Department of Pensions and National Health of Canada, as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Cerebrospinal meningitis					1					1
Chicken pox	1			407	417	55	24	3	174	1,081
Diphtheria	3	1		34	10	10	1		6	65
Dysentery				1						1
Erysipelas				12	5	4	1	3	2	27
Influenza	17	1			7				19	44
Measles	155	54	1,271	4,508	176	151	148	140	6,663	
Mumps	28			437	256	8	32	26	787	
Pneumonia	6			43		1			23	73
Poliomyelitis				1						1
Scarlet fever	26	4	361	272	14	15	13	56	761	
Trachoma					2	1		2		5
Tuberculosis	3	65	18	168	70	20	17	1	33	395
Typhoid fever		2	39	6			2	6	1	56
Undulant fever							2			2
Whooping cough		4	2	185	211	85	126	7	126	746

DENMARK

Communicable diseases—January–March 1935.—During the months of January, February, and March 1935, cases of certain communicable diseases were reported in Denmark, as follows:

Disease	January	February	March	Disease	January	February	March
Cerebrospinal meningitis	4	4	10	Paradsentery	168	49	29
Chicken pox	34	66	45	Paratyphoid fever	-----	6	11
Diphtheria and croup	430	379	375	Poliomyelitis	75	32	31
Epidemic encephalitis	2	6	8	Puerperal fever	16	15	18
Erysipelas	310	304	289	Scabies	1,049	780	710
German measles	15	17	55	Scarlet fever	740	625	604
Gonorrhea	883	685	765	Syphilis	82	79	77
Influenza	7,915	13,746	31,280	Tetanus neonatorum	4	3	2
Malaria	13	6	7	Typhoid fever	4	2	-----
Measles	11,722	13,205	13,677	Undulant fever (Bact. abort. Bang)	38	48	37
Mumps	811	940	947	Whooping cough	2,523	2,347	2,360

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

(NOTE.—A table giving current information of the world prevalence of quarantinable diseases appeared in the PUBLIC HEALTH REPORTS for May 31, 1935, pp. 749-763. A similar cumulative table will appear in the PUBLIC HEALTH REPORTS to be issued June 28, 1935, and thereafter, at least for the time being, in the issue published on the last Friday of each month.)

Plague

Argentina—Victorica.—According to information dated May 17, 1935, 1 suspected case of bubonic plague was reported at Victorica, La Pampa Territory, Argentina.

Bechuanaland Protectorate.—On April 18, 1935, numerous plague-infected rodents were found in the districts of Gaberones and Lobatsi and also in the Bamalete, Batlokwa, Bakwena, and Bakgatla Reserves. On April 20 and May 1, 1935, respectively, 2 cases of human plague were reported.

United States—Oregon.—A report of plague-infected ground squirrels in Oregon appears on page 824 of this issue of PUBLIC HEALTH REPORTS.

X